



# ARP[E]

## ARP [E] - Reliability Engineer

### Asset Reliability Practitioner Training & Certification

The **Asset Reliability Practitioner [E] Reliability Engineer** course is designed for reliability engineers, those who are transitioning into a reliability role and people who are directly involved in asset management or performance improvement.

The course covers all the areas that are necessary to be able to address the causes of equipment unreliability and how to identify, prioritise and cost-effectively fix reliability issues.

Anyone can do the course and exam, however the pre-requisite for certification is a minimum of 24 months relevant work experience.

#### Key Topics

- A Model Plan for developing Reliability Improvement
- Addressing People Management and Culture issues
- Asset Criticality Analysis and RCM /FMECA analysis
- Developing an Asset Management Strategy
- Reliability Engineering Techniques and Analytical Tools
- RCFA/RCA Techniques
- Defect Elimination and Pro-active maintenance activities
- Precision Installation & Maintenance
- Condition Monitoring Techniques and their applications
- Sustaining and Continuing Improvements

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### Detailed topic list:

#### INTRODUCTION

- Goals of the course
- Goals of reliability improvement
- How reliability/performance improvement is aligned with asset management, operational excellence, TPM and Lean initiatives
- The roles of the Reliability Engineer ARP[E] and Program Leader ARP[L].

#### STRATEGY AND IMPLEMENTATION

- The many benefits of a reliable operation
- Aligning a reliability program to business needs
- How to assist in the development of a "roadmap" and the essential elements required
- Understanding maintenance strategies:
  - Run to fail [RTF]
  - Condition-based maintenance [CBM]
  - Interval-based (preventive) maintenance [PM]

#### PEOPLE MANAGEMENT

- Culture change strategies
- Gaining & retaining senior management support
- Engaging people in the reliability improvement effort.
- Human error and psychology

#### DEFECT ELIMINATION

- Designing for reliability
- Procurement for the lowest life-cycle costs
- Managing outside contractors & vendors
- Acceptance testing
- Stores management & caring for spares
- Precision and proactive maintenance
- Operations and operator driven reliability [ODR]

#### RELIABILITY ENGINEERING

- Reliability fundamentals
- Nolan & Heap and other studies on failure patterns
- Failure modes and consequences
- The pros and cons of doing PMs and the case for condition-based maintenance
- Understanding hidden failures
- Determining the reliability of an asset
- Calculating MTBF, MTTR and MTTF
- The use of statistics in reliability analysis
- Analyzing reliability data using Weibull, Pareto and other techniques
- Reliability Block Diagrams [RBD]
- An introduction to life cycle cost analysis

#### ASSET STRATEGY DEVELOPMENT

- Developing the master asset list
- Utilizing ISO 14224 to define the hierarchy
- Developing the Bill of Materials
- Developing an asset criticality ranking [ACR]
- Failure Modes, Effects & Criticality Analysis
- Reliability Centered Maintenance [RCM]
  - What is "classic" RCM
  - Understanding the seven key elements of the RCM process according to SAE JA1011
  - How to prioritize the RCM process
  - The logical process to establish the mix of the following outcomes on each asset
    - Run-to-fail [RTF]
    - Condition-Based Maintenance [CBM]
    - Interval-based Maintenance or Preventive Maintenance [PM]
    - Hidden-failure finding tasks [HFFT]
    - Redesign for improved reliability

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### WORK AND SPARES MANAGEMENT

- A model for work flow processes
- Work management as the foundation for maintenance, condition monitoring and reliability
- Prioritizing work requests
- Managing Condition Monitoring reports
- Managing PMs
- Managing break-in or emergency work
- Maintenance Planning & Scheduling
- Job tasks and responsibilities
- MRO spares and material management
- Failure Codes
- Reporting, KPIs and continuous improvement

### PRECISION SKILLS AND PROACTIVE MAINTENANCE

- What is precision and the importance of precision installation
- Precision mechanical and electrical fastening
- Precision shaft and belt alignment
- Soft foot correction
- Precision balancing and balancing standards
- The importance of developing and following written procedures
- The importance of precision installation in components such as bearings, seals, gears, power transmission and electrical equipment
- The key operating principles of rolling element and journal bearings, gears and hydraulic components and how they impact on the reliability of rotating equipment
- Understanding common electrical system system faults
- Understand mechanical resonance and the basic correction techniques.
- Precision lubrication (oil and grease) including selection, storage, replenishment and the effects of contamination.
- Filtration and ISO 4406 cleanliness standards
- Keeping equipment and workplaces clean and organised.
- The importance of commissioning and following the correct start-up procedures

### ROOT CAUSE ANALYSIS

- Root Cause and Root Cause Failure Analysis [RCA and RCFA]
- How to perform RC(F)A
- Determining when it is justified to perform RC(F)A and selecting the appropriate process
- A review of 5-whys, fault-tree, Ishikawa, and other techniques
- A systematic approach to determining the root cause(s), determining the solution(s), selecting and implementing the best solution, verifying the results and managing the process

### CONDITION MONITORING

- Overview of CM principals for mechanical and electrical equipment
- The relationship between CM, planning and scheduling and operations
- An introduction to the technology & application of:
  - Vibration analysis
  - Ultrasound
  - Oil analysis & Wear particle analysis
  - Infrared (Thermal Imaging) analysis
  - Electric motor & equipment testing
  - Non Destructive Testing [NDT]
  - Process/performance monitoring
  - Visual inspections

### CONTINUOUS IMPROVEMENT

- The importance of continuous improvement, Kaizen & PDCA principals
- The need to reassess business conditions and what is critical
- Utilizing metrics to measure & improve performance
- The need to collect accurate data
- Communicating results and success
- The importance of establishing the right KPIs
- The need for on-going education, training and skills development.



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## Course Details

### Classroom Course:

Duration: 5 days  
Classroom courses are held either as public courses or in-house.  
Classroom students are given free access to the on-line course for 4 months from enrollment.  
A hard copy course manual is supplied at the course.

### Certification Exam:

The certification exam is held on the afternoon of the last day of the course.

### Distance Learning (on-line) Course:

The course is made up of videos of short studio recordings, totaling 48 hours, presented by Jason Tranter, the renowned Mobius CEO and founder. It is very comprehensive and informative, with audio commentary and animated visual slides.  
Students can watch the videos more than once.  
A colour bound printed course manual is provided to follow the course and study offline. Students can choose either 4 months study access or Life-Time access (with no expiry date).

### Certification Exam:

The certification exam can be taken on-line with supervision of an approved invigilator.

### ARP[E] Certification requires:

1. Prerequisite of a minimum of 24 month's verified work experience
2. Completing the whole course either in a classroom or on-line
3. Passing the exam with a minimum of 70%

**Exam:** The exam is 3 hours, closed-book with 100 multiple choice questions.

## Highly credentialed certification

The Asset Reliability Practitioner (ARP) certification scheme follows the independent format of the time-tested ISO certification programs, such as ISO 18436, and it follows the guidelines defined under ISO/IEC 17024 – the same process followed by the independently accredited Mobius Institute Board of Certification [MIBoC] certification scheme that has already certified tens of thousands of men and women from over 170 countries.

## ARP [E] Certification



All MIBoC certified reliability practitioners receive personalized logos with their certification number and name for their own professional use. Mobius Institute also maintains a listing of all certified analysts on their website and provides each person with a certification confirmation webpage.

For more information about Mobius Institute's accreditation, please visit [www.mobiusinstitute.com/certification](http://www.mobiusinstitute.com/certification).



Learn more about other Classroom or On-Line training options. Contact

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